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Hypophysis-Adrenal Cortex System Function in Vestibulo-vegetative Syndrome After Dalargin and Nalorphin Injection

18400152 Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian (manuscript received 17 Dec 86) Vol 104, No 9, Sep 87 pp 321-322

[Article by V. S. Shashkov, V. V. Yasnetsov, Yu. V. Drozd, B. V. Afonin and S. K. Karsanova, Institute of Biomedical Problems, USSR Ministry of Health, Moscow]

[Abstract] A study of the action mechanisms of dalargin and nalorphin, drugs which interact with opiate receptors, during the vestibulo-vegetative syndrome, was described and discussed. The effect of the drugs on the dynamics of ACTH, cortisol and beta-endorphin levels during vestibulo-vegetative stress was studied in 9 persons with an initially low level of vestibulo-vegetative stability. Vestibulo-vegetative stability was modelled by measuring the cumulative effect of Coriolis and precessional accelerations during rotation of the subjects in a BU-4M chair. Dalargin (1-4 mg) and nalorphin (5 mg) and a placebo were injected intravenously 5-15 minutes before rotation. Dalargin reduced the beta-endorphin level in plasma due to compensatory increase of peptidase activity. ACTH, cortisol and beta-endorphin activity increased signifcantly immediately after the tests. The greatest beta-endorphin activity increase occurred after acceleration tests following nalorphin injection, justifying the assumption that opiate receptor blockage makes the subjects less sensitive to beta-endorphin. The greatest increase of ACTH activity occurred after use of dalargin. A hormonal conflict as well as a sensory conflict was apparent during vestibulo-vegetative syndrome. The ACTH/beta-endorphin ratio increases during chronic stress, causing increased sensitivity to pain. In the experiments, this ratio was highest after use of dalargin and lowest after nalorphin injection. References 14: 6 Russian; 8 Western.

02791

Effect of Weightlessness on Brain Development (Results of Flight of Pregnant Rats on "Kosmos-1514" Biosatellite and Study of Subsequent Development of Their Progeny on Earth)

18400158a Leningrad ARKHIV ANATOMII, GISTOLOGII I EMBRIOLOGII in Russian (manuscript received 10 Feb 87) Vol 93, No 9, Sep 87 pp 20-26

[Article by S. N. Olenev, A. R. Danilov, T. A. Kryuchkova, L. M. Sorokina and I. B. Krasnov, Department of Biology (headed by Professor S. Ye. Shpilenya) and Central Scientific Research Laboratory (headed by I. S. Podosinnikov, Candidate of Medical Sciences), Leningrad Pediatric Medical Institute]

[Abstract] Materials obtained from the biosatellite "Kosmos-1514", launched in December 1983, were used to determine whether or not weightlessness causes changes in brain development in rats and, if it does, what processes are responsible and what are the consequences of these changes during further development on Earth. The rats were under conditions of weightlessness on the 13th day of pregnancy and were in flight for 6 days. Some fetal material was taken immediately after landing and some was taken on the 15th, 30th and 90th day of development, and this material was compared to fetal material of rats kept on Earth. Morphological processes such as reproduction, migration, neuronal differentiation, growth of processes, establishment of nervous connection and vascularization developed rather completely during weightlessness and brief acceleration upon landing. The rats experiencing weightlessness showed a change in development of the cerebral capillaries; there were more of them and they were thinner. Changes in migration rate of cells were evident from study of the cortical plate formation. Macroscopic examination of fixed brain pieces showed no appreciable differences between the experimental rats and control rats. Changes noticed in experimental rats diminished during further development on Earth. Figures 2; references 13: 10 Russian; 3 Western.

02791

Significance of Sensory Signal Phase Mismatch in Mechanisms of Motion Sickness Development

18400158b Moscow IZVESTIYA AKADEMII NAUK SSSR. SERIYA BIOLOGICHESKAYA in Russian No 5, Sep-Oct 87 (manuscript received 12 Jul 86) pp 753-761

[Article by O. A. Vorobyev]

[Abstract] A study of features of combined stimulation of vestibular and extrapyrimidal structures under complex dynamic conditions, which produces motion sickness, with use of materials from the author's research and from the literature, was described and discussed. The study included electronystagmographic study of 6 males during performance of 3 versions of a test of the continuous effect of Coriolis accelerations. The study of the effect on man of angular, linear and Coriolis acceleration and opticokinetic stimuli confirmed that the susceptibility to motion sickness under complex dynamic conditions is determined predominantly by the degree of phase mismatch of sensory signals of different analyzer systems. Types of motion sickness were examined from these positions. It was found that motion sickness results from "volumetric" excitation in the central nervous system, spreading to the higher autonomic centers, which may occur according to the holographical principle of conversion of sensory signals with phase heterogeneity. This suggests that phase mismatch of sensory signals plays a major part in development of motion sickness. Figures 2; references 45: 19 Russian; 26 Western.

02791

Current Disease-resistant Crop Varieties

18400159 Moscow ZASHCHITA RASTENIY in Russian No 9, Sep 87 p 32

[Article by N. N. Guseva, department head, All-Union Institute of Plant Protection, N. A. Kabalkina, sector chief of the State Commission of Strain Testing of Farm Crops]

[Abstract] A discussion of varieties of basic farm crops which are carriers of immunity factors to one disease or another pointed out that most of these varieties do not differ in immunological reliability in relation to the most harmful pathogens. Only one-fifth of varieties cultivated are immune to one or, rarely, 2-3 diseases and practically none have group immunity. Varieties of winter and spring wheat which are slightly susceptible to brown rust were listed. Widespread use of nonspecific resistance shows promise, but its level is low in contemporary varieties while it is more typical in some old varieties. Successes achieved in developing complex immunity in barley, wheat and winter rye were discussed briefly. Development of immunity in potatoes, sunflowers, tomatoes, pulse crops and alfalfa was also discussed briefly. Solution of the fodder problem requires improvement of the work of the Northwestern Scientific Research Institute of Agriculture, the All-Union Scientific Research Institute of Corn Growing and the Lithuanian Scientific Research Institute of Agriculture in relation to clover and alfalfa.

02791

Sulfinyl-Containing Crown Ethers
18400065a Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 8, Aug 87 (manuscript received 20 Feb 87) pp 55-57

[Article by A. M. Pinchuk, A. V. Podgornyy, V. A. Zasorina, G. G. Talanova and A. S. Shtepanek, Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev]

[Abstract] A mixture of benzosulfinyl-11-crown-4 and dibenzodisulfinyl-22-crown-8 was synthesized from 1,2-di(2-hydroxyethoxy)benzene and thionyl chloride using triethylamine. The ratio of mono and disulfinyl ethers produced could be controlled by varying solvent polarity, with the highest yield of monosulfinyl ether obtained in acetonitrile. The reaction was conducted by slow, dropwise addition of both reagents at 1-3°C in flowing argon. The disulfinyl ether crystallized from the reaction mixture. To obtain the monosulfinyl ether the filtrate was chromatographed on an alumina column with a benzene eluent. If the reaction was conducted in benzene only the disulfinyl crown ether was obtained. Biological investigation of the crown ethers synthesized demonstrated that they have weak antiproteolytic activity. The ethers are complexing agents for lithium and barium ions. The monosulfinyl crown ether barium picrate and the disulfinyl crown ether barium and lithium picrates were synthesized by heating with the corresponding picrate or by dissolution in a minimal quantity of acetonitrile and cooling. Yields were 37%-51%. The crown ethers and their complexes are stable to prolonged storage. References 3 (Western).

12126

Dibenzo-di(methylphosphonyl)-22-crown-8
18400065b Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 9, Sep 87 (manuscript received 20 Feb 87) pp 53-56

[Article by A. M. Pinchuk, A. V. Podgornyy, V. A. Zasorina, G. G. Talanova and A. S. Shtepanek, Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev]

[Abstract] Dibenzo-di(methylphosphonyl)-22-crown-8 (I), which is predicted to be a strong complexing agent due to the isolation of both phosphonyl groups from the aromatic moieties, was synthesized from 1,2-di(2-hydroxyethoxy)benzene and methylphosphonic acid chloride using triethylamine. The reaction was conducted by dropwise addition of the reagents in acetonitrile at 5°C in flowing argon. Sodium pyroactechol and the 2,2-dichlorodiethyl ester of phosphonic acid do not form I under similar conditions. I is the first phosphorus-containing crown ether which is soluble in water as well as organic solvents. I complexes with alkali and alkaline earth metals, in a similar fashion to dibenzo-18-crown-6. Sodium forms a more stable complex than lithium, which is in turn much more stable than the potassium complex. I forms its most stable complex with calcium. The lithium and calcium picrate complexes were crystallized and characterized.

12126

Immobilized Systems Which Produce Fibrinolytic Proteases
18400066a Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 296, No 2, Sep 87 (manuscript received 16 Apr 84) pp 475-477

[Article by N. S. Yegorov, N. S. Landau and I. B. Kotova, Moscow State University imeni M. V. Lomonosov]

[Abstract] The possibility of using immobilized cells for the biosynthesis of fibrinolytic enzymes was studied. The biosynthesis of these proteases by immobilized cells has not been reported in the literature. Norcardia minima strain 1, which synthesizes proteases, and Arthrobacter citreus BKM-654, which does not, were immobilized on calcium alginate, polyacrylamide gel or polyvinyl alcohol gel. Arthrobacter was chosen due to its production of a polysaccharride stimulatory factor which increases Norcardia biosynthetic activity by a factor of 1.5. Calcium chloride had a positive effect on growth, while the components of polyacrylamide, particularly TEMED, had a negative effect. When the two strains were immobilized together, the optimal ratio was 1.5 g Norcardia to 1.0 g Arthrobacter. During the first nine days the mixed culture had more biosynthetic activity than the Norcardia monoculture, but subsequently the Arthrobacter began to be eliminated from the gel. Growing the cultures in the gel eliminated this problem. Immobilization of Norcardia increased enzyme yield by a factor of 1.5-2.2, while in the binary system enzyme activity increased by a factor of 1.6-3.3. Both immobilization and the stimulatory factor may increase the permeability of Norcardia membranes. References 12: 7 Russian, 5 Western.

12126

Relative Location of Pigment-Protein Complexes in Membranes of Sulfur-Containing Photosynthetic Bacteria Chromatium minutissimum
18400066b Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 296, No 2, Sep 87 (manuscript received 16 Apr 84) pp 483-486

[Article by A. A. Moskalenko and O. A. Toropygina, Institute of Soil Sacince and Photosynthesis, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] Three types of pigment-protein complexes have been discovered in the membranes of most species of photosynthetic bacteria which contain bacteriochlorophyll a: B800-850, B890(870) and the reaction center. In order to obtain further understanding of the complexes, the relative distribution of the A890 ensemble and the B800-850 complex was studied directly in the membranes of the sulfur-containing, purple photosynthetic bacterium Chromatium minutissimum using two hydrophobic cross-linking agents: disuccinimyl ditartrate (DST) and dithio-bis-succinimidyl propionate (DSP). The results were analyzed with bidirectional

polyacrylamide gel electrophoresis using Triton X-100. It was found that DSP, whose length is double that of DST, forms more large associates than DST. Preliminary incubation of the chromotophores with detergent prevents aggregate formation. DSP and 25 mM DST increased the electrophoretic mobility of B800-850 by 20%-30%, suggesting interaction with monomer. Data on the distribution of bacteriochlorophyll between the zones and complexes in the zones demonstrated that some free B800-850 is always found in the zones. Only small amounts of oligomers were found after cross-linking. No A890 monomer was found in cross-linked samples, even at low DST concentrations. The data indicate that the A890 ensembles, which contain B890 and the reaction center, are not in contact with each other, but can only associate with B800-850. About 5%of the B800-850 is in direct contact with A890, forming an associate around which the basic B800-850 complexes are localized. A small amount of B800-850 (10%-15%) interacts weakly with other complexes or their associates. Figures 2; references 15: 4 Russian, 11 Western.

12126

Ox Retina Cyclic GMP Phosphodiesterase. Amino Acid Sequence of Alpha Subunit and Nucleotide Sequence of cDNA

18400066c Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 296, No 2, Sep 87 (manuscript received 7 Jul 87) pp 487-491

[Article by Yu. A. Ovchinnikov, V. V. Gubanov, N. V. Khramtsov, N. B. Akhmedov, K. A. Ishchenko, V. Ye. Zagranichnyy, I. A. Vasilevskaya, T. V. Rakitina, N. V. Atabekova, A. A. Barinov, Kh. G. Muradov, T. M. Shuvayeva, N. S. Bystrov, I. V. Severtsova and V. M. Lipkin, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Cyclic GMP phosphodiesterase participates with rhodopsin and transducin in transmission and amplification of visual signals. This work reports the amino acid sequence of the alpha-subunit of this enzyme. Due to separation problems, the research was conducted on a mixture of alpha and beta subunits, which were cleaved with cyanogen bromide and fractionated on Toyopearl HW-40 in 10%formic acid. Further purification was accomplished by reverse-phase HPLC. Large fragments were hydrolyzed with trypsin, with subsequent fraction and purification. Based on complete or partial sequencing of the fragments, various nucleotide probes were synthesized and used for clone screening. The alpha and beta subunits of the enzyme were then separated by SDS-PAGE electrophoresis and cleaved with cyanogen bromide directly on the gel. After elution and purification, the alpha subunit gave two peptides, the N-terminal sequence of which confirmed that the cDNA from the clones coded for the alpha subunit. Five oligodesoxyribonucleotide probes corresponding to possible 5' sequences and two corresponding to possible C-terminal sequences were synthesized and used to screen clones. Determining the nucleotide sequence of the selected clones permitted reconstruction of the sequence of alpha-subunit c-DNA. Tryptic hydrolysis gave an N-terminal peptide with an acetylated terminal amino group, indicating posttranslational acetylation of glycine after cleavage of methionine. The data was conbined to give a final alpha-subunit sequence of 858 amino aicds, total molecular weight 99,261 daltons. Clones were also isolated for the beta subunit and 70%of its sequence established. Close homology between the two subunits was observed. Figures 2; references 7 (Western).

12126

Quasireversible Electrochemical Reaction of Ferredoxin

18400070 Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 296, No 2, Sep 87 (manuscript received 19 Feb 87) pp 470-474

[Article by G. P. Shumakovich, B. A. Kuznetsov, I. V. Berezin, associate member, USSR Academy of Sciences, V. K. Gins, Ye. N. Mukhin, Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Science, Moscow; Institute of Soil Science and Photosynthesis, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] The unmediated transfer of electrons from a protein to various electrodes was first demonstrated with cytochrome in 1971, using acceleration of electron transfer with cross-linkage relays. In this connection, an investigation of the electrochemical reactions of pea sprout ferredoxin was conducted. A gold electrode modified with di(4-pyridyl)disulfide was employed. The stability of the modified electrode was demonstrated with cytochrome c. The cyclic volt-amperogram of native ferredoxin was found to have a cathode potential peak at -0.69 V and an anode peak at -0.56 V. The volt-amperogram had a diffusion quasireversible form, with the potential difference between the peaks, 130 mV, exceeding the theoretical value for a reversible single-electron process. The size of the cathode peak current was linearly proportional to ferredoxin concentration up to 0.5 mM. Storage or heating significantly decreased the intensity of the electrochemical processes. The data indicate that the modified electrode permits determination of the redox potential and number of transferred electrons in native ferredoxin. Figures 3; references 15: 5 Russian, 10 Western.

12126

Function of Receptor-Channel Complex in Limnaea stagnalis Membranes

18400069a Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 296, No 2, Sep 87 (manuscript received 14 Aug 86) pp 465-470

[Article by V. A. Panarin, V. A. Kondratyev, O. A. Rayevskiy and I. V. Martynov, Institute of Physiologically Active Substances USSR Academy of Sciences, Chernogolovka, Moscow Oblast]

[Abstract] In previous work on the acetylcholine receptors of L. stagnalis, which are associated with chloride channels, the value of the open channel state time, τ, measured by the relaxation method differed from that obtained by the "noise" method by more than a factor of two. This difference suggests that the different times reflect different stages in agonist receptor interaction. Experiments were conducted to verify the validity of this concept and to construct a kinetic model of receptor-channel-complex function in L. stagnalis neuron. The value of τ measured by the noise method was 16 plus or minus 5 msec, independent of membrane potential, whereas τ determined by the relaxation method on the same neurons was 54 plus or minus 4 msec. Increasing acetylcholine concentration did not alter τ-noise but decreased τ-relaxation. Decreasing temperature increased τ-noise by 20%-30%and τ-relaxation by 300%-400%. The permeability of one channel to acetylcholine and suberylcholine was identical. The data indicate that relaxation measures binding of receptor to agonist, rather than channel opening time. If one postulates that two molecules of agonist are needed to open an ion channel, then one may describe four closed states and one open state. Receptor activation after binding two molecules of agonist is the rate determining step, slower than channel opening.

12126

Inactivation of Sodium Pump Leads to Activation of Potassium and Inactivation of Chloride Channels in Snail Giant Neuron Chemoreceptor Membrane

18400069b Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 296, No 4, Oct 87 (manuscript received 24 Apr 87) pp 998-1001

[Article by S. N. Ayrapetyan, V. L. Arvanov, S. B. Mazhinyan and K. B. Azatyan, Institute of Experimental Biology, ArSSR Academy of Sciences, Yerevan]

[Abstract] The functional relationship between the activity of the sodium pump and the function of chemoreceptor ion channels was studied. It was previously demonstrated that the snail giant neuron membrane has two types of choline receptors: type A, involving chloride and sodium permeability and sensitive to ouabain, and type B, associated with potassium and sodium channels and not sensitive to ouabain. The volt-ampere characteristics of the acetylcholine response in type A neurons were recorded with and without ouabain. Inactivation of the sodium pump by preliminary incubation in a potassium-free solution shifted the response to ouabain and ion concentrations. Activation of the sodium pump by increasing the external sodium ion concentration resulted in ouabain blocking effects in type B receptors. This indicates that activating the sodium pump leads to activation of chloride and inactivation of potassium channels, while the inverse occurs when the sodium pump is inactivated. It is possible that, depending on the function of the sodium pump, the affinity of the acetylcholine receptors changes so as to change the probability of acetylcholine interacting with type A and B receptors, or that the sodium pump regulates ion channel selectivity in some other manner. This may be achieved via changes in the degree of membrane phosphorylation. Figures 2; references 8: 3 Russian, 5 Western.

12126

Genetically Engineered Hepatitis B Vaccine

18400306 Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 Apr 88 p 4

[Article by V. Lagovskiy: "Virus Helps Physicians Battle Dangerous Diseases"]

[Text] **At first the researchers administered the preparation to themselves. There were eleven persons who took that daring step, almost everyone who participated in the experiment. So began the country's first testing of a vaccine obtained by genetic engineering —variola-hepatitis vaccine.**

The hepatitis B virus is insidious. It is not killed upon boiling. It is highly infectious. One can become infected from even a minute trace at the end of a needle. Dispensable syringes are helpful in protecting people against infection. As is known, we have a shortage of such syringes. In that case a vaccine could become an effective means of prevention. And it is only a vaccine that can protect an infant against neonatal hepatitis if the virus is in the mother's blood. But why create a vaccine against two diseases if one of them, smallpox, was conquered more than ten years ago?

"The body must be prepared for protection," said doctor of medical sciences A. Altshteyn. "The lymphocytes are the principal actors of the immune system and they must know beforehand what enemy they should attack. Consequently, they must be given a "portrait" of the enemy. It would seem that this can be done quite simply. One need only inject the viruses in question, but only in an attenuated or killed state. But where is one to obtain them in the quantity that is needed?

Alas, it is impossible to cultivate the hepatitis B virus under laboratory conditions. Researchers have not even tried to resolve that task. Experiments have shown that in order to develop immunity against a virus it is not at all necessary to present an entire "portrait" of the culprit. A small segment such as a minute piece of the viral protein coat would suffice.

At first glance even this approach would not seem to make much sense since not one but many "scraps" would have to be obtained. But by that time scientists at the Latvian Academy of Sciences Institute of Organic Synthesis have obtained and studied the DNA from the hepatitis B virus. And when they found the gene that codes the manufacture of the required protein, they got the original idea of "sewing" it into the smallpox virus vaccine.

"That selection was not a random one," said A. Altshteyn. "Medicine has been using the virus of the smallpox vaccine for more than 200 years so that one cannot become ill from that virus, and immunity against it can be acquired. Previously, immunity could only be acquired against smallpox, but now, with additional "programming," it can be acquired against hepatitis B too. And working with the vaccine is quite convenient. The required gene has only to be inserted one time after which the altered viruses can be reproduced in the laboratory. Without losing any makeweight they rapidly multiply in the human body as would live viruses. Only a minimum dose is required for inoculation.

There is yet another way which was taken by scientists at the USSR Academy of Sciences Institute of Molecular Biology and the USSR Academy of Medical Sciences Institute of Virology. There scientists have learned how to transplant the DNA from hepatitis B viruses into yeast fungi. They produce viral antigen proteins. If these are introduced into the blood the body acquires immunity. Is this method perhaps better?

"We are not opponents but allies in that case," said A. Altshteyn. "The required vaccines are variable. The preparation produced by our colleagues will be fine for a massive assault where one can administer a large dose of antigens at once. The live vaccine is suitable for massive prophylaxis and is much cheaper."

Also interesting is the very idea of combining several parts in a single virus. It is a tricky idea, of course, but it could enable a body to acquire resistance to two diseases at once. Such an immunity would be of fundamental importance. Scientists presume that not one but many genes can be transplanted, and this means one can simultaneously battle against a number of diseases.

For example, a scrap of a "portrait" was recently found from which lymphocytes can also recognize the AIDS virus. Attempts were made to attach it onto the less dangerous smallpox vaccine virus. Who knows, perhaps this method will lead to a long awaited preventive agent?

Now scientists at the USSR Academy of Sciences Institute of General Genetics, the Moscow Scientific-Research Institute of Viral Preparations, and the USSR Academy of Sciences Institute of Microorganism Biochemistry and Physiology are convinced that the vaccine they have "designed" against hepatitis B is functional and harmless. But this is only the first step that has been taken in a new direction. Research is continuing. The preparation's effectiveness must be improved and it must be prepared for the most important tests which are the clinical tests.

6289

Comparative Analysis of Effect of Pulsed and Continuous Low-Intensity Laser Radiation on Regeneration of Irradiated Skeletal Muscles

18400073 Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 296, No 5, Oct 87 (manuscript received 27 May 87) pp 1248-1251

[Article by M. F. Popova, Sh. G. Ilyasova, and V. M. Inyushin, Institute of Evolutionary Morphology and Ecology of Animals imeni A. N. Severtsov, USSR Academy of Sciences, Moscow]

[Abstract] A comparative histological study was conducted on the therapeutic effects of helium-neon lasers on transplant regeneration in skeletal muscles which had been exposed to ionizing radiation. White rats were exposed to 10.0 Gy doses to the extremeties, followed 2-3 hours later by autotransplantation of the gastrocnemius muscle. Without laser treatment the ionizing radiation suppressed the reconstruction of the transplant and the resorption of necrotic tissue. Continuous 3-minute laser treatment once daily for 10 days improved muscle reconstruction, particularly at the edges of the transplant. After two months the tissue had a mixed muscle and connective tissue structure, but with innervation and contractile ability. A pulsed treatment consisting of 20 pulses of 3-second duration gave poor results. Using 60 pulses of 3 seconds each gave favorable results, but not exceeding those achieved with continuous laser treatment. The results are related to laser stimulation of energetic metabolism and postradiation repair. Figures 2; references 12 (Russian).

12126

Experimental Evaluation of Biocompatable DNA-Containing Hemoimmunosorbents Based on Activated Carbon

18400075 Moscow DOKLADY AKADEMII NAUK SSSR. SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 9, Sep 87 (manuscript received 16 Mar 87) pp 79-81

[Article by Ye. A. Snezhkova, E. Bim, L. V. Bonatskaya, and D. Falkenkhagen, Institute for Problems in Oncology, UkSSR Academy of Sciences, Kiev; University imeni V. Pik, Rostok, German Democratic Republic]

[Abstract] Perfusion through DNA-containing sorbents or activated carbon permits antibodies to DNA and desoxyribonucleoproteins (DNP) to be removed from plasma, leading to remissions in systemic lupus erythematosus. To combine the useful effects of both specific and nonspecific sorbent, DNA-containing activated carbon sorbents were prepared. Calf thymus native DNA was immobilized at 2.2 mg/m or 7.7 mg/g. In vitro experiments demonstrate that CH-50, C_3, C_3-activator, C_4, C_5, C_{1q}, IgG, IgA, IgM, IgD, transferrin, alpha$_2$-macroglobulin, ceruloplasmin, beta-lipoproteins, fibrinogen, plasminogen, total protein and total lipid levels in plasma and heparinized whole blood are unchanged after contact with granular or fibrous activated carbon, with or without sorbed DNA. Calcium ion concentration decreased after contact with granular carbon, both with and without DNA, but not with fibrous carbon. Sodium, potassium and chloride ions were unaffected. The number of thrombocytes present decreased after 120 minutes of continuous perfusion of live rat blood through the granular sorbent. The results confirm that uncovered granular carbon sorbents are not inferior in hemocompatability, compared to the new dialysis membranes or microencapsulated heomsorbents. Fibrous sorbents do not activate the complement system. Adding DNA to the sorbent does not change its hemocompatability, indicating that these sorbents are promising for extracting DNA and DNP antibodies from whole blood. Figures 1; references 14: 8 Russian, 6 Western.

12126

Modification of p53 Oncoprotein in HT 1080 Human Tumor Cell Line

18400074 Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 296, No 3, Sep 87 (manuscript received 13 Mar 87) pp 757-759

[Article by T. O. Maymetz and J. R. Jenkins, Republic Biocenter for Genetic and Cellular Engineering, ESSR Academy of Sciences, Tartu]

[Abstract] Protein p53, a cellular oncogene product, is a short-lived phosphoprotein which is probably localized in the nucleus. The expression of the protein in line HT 1080, fast-dividing, fully transformed cells obtained from human fibrosarcoma, was studied and compared to expression in normal human leukocytes and slightly transformed cells from human melanoma line RPMI 5966. This work is the first demonstration of a modified protein p53 in human cancer cells. While the exact modification is unknown, it is proposed that the C-terminus is bound to some other cellular component, making it unavailable to antibody. Protein p53 was initially measured using immunoprecipitation with monoclonal antibody pAb421, which recognizes the C-terminus. However, the antibody precipitated p53 only from RPMI 5966 cells. The p53 gene was analyzed using restrictase fragmentation transfer and hybridization with labeled CTP. This showed that the p53 gene was present in the HT 1080 genome and did not contain large deletions. p53-Specific mRNA levels were similar in HT 1080, RPMI 5966 and normal leukocyte cells, with the HT 1080 levels somewhat higher. The results indicated that HT 1080 cells contain protein p53, with normal structures at the gene and RNA levels but not binding with C-terminus-specific antibodies. The half-life of p53, as measured by pulse-chase with labeled methionine, was about 4 hours in HT 1080, compared with 20-25 minutes in RPMI 5966. This greater stability also suggests interaction with some other cellular molecule. It is noted that the precipitation of p53 from HT 1080 actually gives two bands of very close molecular weight, indicating possible interaction with nucleic acids. Interaction between oncoproteins and other regulatory proteins, leading to various effects on the cellular level and activation of the oncogene, is likely. Figures 3; references 15(Russian).

12126

Optimized Process for Theophylline Microencapsulation

18400180 Moscow FARMATSIYA in Russian No 5, Sep-Oct 87 (manuscript received 30 Sep 86) pp 6-9

[Article by I. A. Muravyev and I. N. Andreyeva, Pyatigorsk Pharmaceutical Institute]

[Text] *The manufacture of medicinal forms with a high degree of pharmacotherapeutic efficacy is related to the study of the interaction between an entire complex of variable factors and broadly based biopharmaceutical research. The search for a scientifically substantiated composition of a medicinal form and the design and optimization of a manufacturing process requires a considerable number of experimental studies, expenditure of valuable materials and a great deal of time. Mathematical experimental design methods are being widely used to resolve those tasks. One of those methods is the Latin square. The use of such methods makes it possible to reduce experimental error significantly and allows for a quantitative evaluation of the factors under examination [3].*

The present work examines the aggregate of manufacturing process factors that affect the quality of theophylline microcapsules in order to optimize the process under study. Microcapsules were produced in order to make a long-acting medicinal form of theophylline.

The microencapsulation process is a complex one and requires consideration of a whole series of variable factors such as concentration of the polymer being used, the volumetric ratio of the polymer material solution to the dispersion medium, the weight ratio of the polymer material to the encapsulated substance, the temperature of the medium, the angular axial rotation rate of the rotary mixer, etc. Each one of those factors to one degree or another affects the granulometric composition of the microcapsules that accounts for their manufacturing process properties and the release rate of the encapsulated substance [1, 2].

Experimental Section

Volatile solvent removal from the dispersion medium which is a simple, accessible, and widely used method, was the method we selected for the microencapsulation of theophylline. The coating material used was domestically manufactured ethyl cellulose, brand LK, which was dissolved in acetone. Petrolatum was used as the dispersion medium.

Of the factors that affect the microencapsulation process, we studied polymer concentration (factor A), ratio of the dispersion medium to dispersion phase (factor B), and medium temperature (factor C). In our preliminary study of the effect that the mixer's rotation rate has on the granulometric composition of the microcapsules, we found that particles sized from 250 to 1,000 microns with good manufacturing properties are formed at a mixing rate of 600 rpm. An increase or decrease of the mixer's rotation rate resulted in either a decrease or increase in the microcapsule size. As a result of our study of the kinetics of theophylline release from capsules with various coating thicknesses, we selected an ethyl cellulose to theophylline ratio of 1:5 as the optimal ratio that would provide for a 70% release of the preparation in one hour. We found that these two parameters were constant in our search for an optimal region for the encapsulation of theophylline. The range of the selected variable factors is given in Table 1.

Table 1. Characteristics of Variable Factors Affecting Theophylline Microencapsulation.

1) Уровни	2) Факторы		
	концентрация полимера (A) 3)	соотношение фаз (B) 4)	температура среды (C) 5)
1	5	1:5	20
2	7	1:10	30
3	9	1:15	40
4	10	1:20	50

Key:
1. Levels
2. Factors
3. Polymer concentration (A)
4. Phase ratio (B)
5. Medium temperature (°C)

The optimization criteria included the amount of theophylline released from the microcapsules into an acid medium in 40 minutes (y_1), the percentage of microcapsules larger than 500 microns (y_2), and the manufacturing process yield of the product (y_3). The release rate of theophylline from the microcapsules into an acid medium was tested spectrophotometrically at a wave length of 271 nm on a "rotating basket" instrument. The mass of the microcapsules in the experiments was taken as 0.03 g.

Each factor under study was examined at four levels of variation in a 4 X 4 Latin square array. In order to verify the value of the indicated factors in the experiment we conducted 16 tests under conditions stipulated by the design matrix. The design matrix and the optimization test results for the theophylline encapsulation process are presented in Table 2. The experimental data were subjected to dispersion analysis whose results are given in Table 3.

A comparison of the obtained dispersion relationships to the tabular value of the Fisher criterion showed that the release rate of theophylline from the microcapsules is affected by factors A and B; the size of the microcapsules is affected by factors A, B, and C; and the manufacture yield of the product is affected by factor A only. From a quantitative analysis of the effect that the three examined factors have on the selected optimization criteria, it is obvious that the interaction effect of A and B remains significant and factor C can be disregarded.

1) № опыта	2) Факторы A	B	C	3) y_1, мкг/мл	y_2, %	y_3, %	4) Количественное содержание теофиллина в микрокапсулах
1	a_1	b_1	c_1	193	83,3	65	84,1±0,9
2	a_1	b_2	c_2	196	74,1	68	85,8±0,5
3	a_1	b_3	c_3	200	51,3	65	86,4±0,7
4	a_1	b_4	c_4	200	47,1	58	84,7±0,7
5	a_2	b_1	c_2	185	85,6	75	83,6±0,8
6	a_2	b_2	c_1	193	79,3	68	82,1±0,9
7	a_2	b_3	c_4	193	67,1	68	83,1±0,5
8	a_2	b_4	c_3	196	62,7	85	86,2±0,4
9	a_3	b_1	c_3	177	82,8	86	85,5±0,5
10	a_3	b_2	c_4	185	75,6	75	85,0±0,7
11	a_3	b_3	c_1	185	71,4	82	82,4±0,8
12	a_3	b_4	c_2	193	70,6	88	84,1±0,7
13	a_4	b_1	c_4	170	85,9	80	83,9±0,6
14	a_4	b_2	c_3	166	76,9	71	82,8±0,9
15	a_4	b_3	c_2	174	75,3	78	84,5±0,4
16	a_4	b_4	c_1	181	73,5	82	84,5±0,7

Table 2. Experimental Design Matrix and Test Results for the Optimization of Theophylline Microencapsulation

Key:
1. Experiment number 2. Factors 3. y_1, μg/ml 4. Quantity of theophylline in microcapsules

1) Критерий оптимизации	2) Источник дисперсии	3) Сумма квадратов	4) Число степеней свободы	5) Средний квадрат	6) $F_{эксп}$	$F_{0,05(6,6)}$
7) Интенсивность высвобождения теофиллина	Фактор A (10)	1337,19	3	445,73	46,2	4,8
	Фактор B (11)	271,69	3	90,56	9,39	4,8
	Фактор C (12)	22,69	3	7,56	0,8	4,8
	Остаток (13)	57,87	6	9,64	—	—
	Общая сумма (14)	1689,44	15	—	—	—
8) Процентное содержание частиц более 0,5 мм	Фактор A (10)	440,7	3	146,9	11,2	4,8
	Фактор B (11)	1109,3	3	369,8	28,2	4,8
	Фактор C (12)	255,3	3	85,1	6,48	4,8
	Остаток (13)	78,8	6	13,13	—	—
	Общая сумма (14)	1884,16	15	—	—	—
9) Технологический выход	Фактор A (10)	756,25	3	252	10,08	4,8
	Фактор B (11)	142,25	3	47,3	1,89	4,8
	Фактор C (12)	122,75	3	40,9	1,64	4,8
	Остаток (13)	150,5	6	25	—	—
	Общая сумма (14)	1171,75	15	—	—	—

Table 3. Dispersion Analysis Data for the Study of Theophylline Release Rate from Microcapsules, Fraction Composition, and Manufacture Yield

Key:
1.Optimization criterion 2.Dispersion source 3.Sum of squares 4.Number of degrees of freedom 5.Root mean square 6.F_{exp} 7.Theophylline release rate 8.Percentage of particles larger than 0.5 mm 9.Production process yield 10.Factor A 11.Factor B 12.Factor C 13.Remainder 14.Total

In our efforts to optimize the process of theophylline microencapsulation we examined three criteria (responses), and we had the problem of consolidating them into a single common parameter whose value could be used to define the entire manufacturing process as a whole. One of the most successful methods of resolving process optimization problems with a large number of criteria is the so-called generalized desirability function [4] which is defined as the median locus of desirabilities for individual properties:

$$D = \sqrt[n]{d_1 d_2 \ldots d_n}.$$

A desirability scale is used to translate natural values into partial desirability functions. The desirability scale is plotted by quantitative analysis with a range of desirability values of from zero to unity and intermediate desirability values corresponding to points 0.2, 0.37, 0.69, and 0.8 which reflect specific levels of product quality, i.e., very poor, poor, satisfactory, and good. In plotting the desirability scale which sets the ratio of the y_1, y_2, and y_3 response values and their corresponding partial criteria of desirability d_1, d_2, and d_3, we defined the worst quality value ($d=0$) as that at which the theophylline release rate from the microcapsules was 205 μg/ml, the particle fraction greater than 500 microns was 45% and the process yield was 55%. The best quality corresponded to the following response values: y_1=160 μg/ml, y_2=90%, and y_3=90%. Intermediate responses were selected accordingly. A graphic illustration of the desirability scale is presented in Figure 1. This scale was used to translate the values y_1, y_2, and y_3 to the partial desirability criteria d_1, d_2, and d_3 and to find the generalized desirability function. The desirability function is summarized in Table 4.

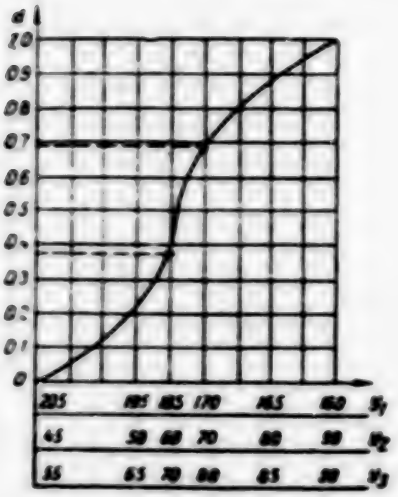

Figure 1. Desirability scale for the manufacture process properties of theophylline microcapsules. d — partial desirability criterion; y_1 — theophylline 40-minute release rate from microcapsules into an acid medium, μg/ml; y_2 — percentage of particles 500 microns and over in the microcapsules; y_3 process yield of microcapsules.

From Table 4 it is apparent that the optimal conditions for the microencapsulation of theophylline are those where the polymer concentration and phase ratio are 9%and 1:5 or 10%and 1:5 and 1:10, respectively, since the generalized desirability function is greater than 0.69 at those values and that corresponds to good quality. As the dispersion analysis has demonstrated, the temperature factor has an insignificant effect on the theophylline encapsulation process as a whole so that the process can be carried out without heating.

1) Опыт	d_1	d_2	d_3	D	1) Опыт	d_1	d_2	d_3	D
1	0,24	0,95	0,55	0,5	9	0,55	0,95	0,94	0,79
2	0,16	0,75	0,63	0,43	10	0,37	0,8	0,5	0,53
3	0,05	0,05	0,5	0,12	11	0,37	0,72	0,8	0,587
4	0,05	0,03	0,02	0,031	12	0,24	0,7	0,98	0,548
5	0,37	0,97	0,8	0,66	13	0,69	0,96	0,9	0,84
6	0,24	0,88	0,65	0,516	14	0,95	0,85	0,71	0,83
7	0,24	0,6	0,65	0,454	15	0,59	0,8	0,63	0,67
8	0,16	0,4	0,9	0,386	16	0,5	0,77	0,8	0,68

Table 4. Summarization of Desirability Function.

Key: 1. Experiment

Conclusions

1. A quantitative analysis of the effect that manufacturing processes have on the microencapsulation of theophylline and the establishment of that process's optimal conditions were carried out by the employment of the Latin square method and a generalized desirability function.

2. The optimal conditions for the microencapsulation process are those where the polymer concentration is 10%, the phase ratio is 1:5 when the weight ratio of the polymer to theophylline is 1:5, and the rotation of the rotary mixer is 600 rpm. The microcapsules are produced in a size range of from 500 to 1,000 microns, and the 40-minute release rate of theophylline from the microcapsules is 64%.

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6289

Enzymologic Indicators in Assessment of Combined Effect of Protein Deficiency and T-2 Mycotoxin

18400164a Moscow VOPROSY PITANIYA in Russian No 5, Sep-Oct 87 (manuscript received 8 Aug 85) pp 61-64

[Article by V. A. Tutelyan, L. V. Kravchenko, Ya. Krizhko and Ya. Khandoga, Laboratory of Enzymology (headed by Doctor of Medical Sciences V. A. Tutelyan), Institute of Nutrition, USSR Academy of Medical Sciences, Moscow; Department of Biochemistry (headed by Professor Ya. Krizhko), Medical Department, Bratislava University imeni Ya. Komenskiy]

[Abstract] A study is presented of the influence of the highly toxic food contaminant T-2 mycotoxin on the activity of the enzymes of certain organs in rats supplied with varying quantities of protein. Primary attention was given to the activity of lysosomal enzymes. Studies were performed on Wistar rats receiving isocaloric rations containing 18% (groups 1 and 2) or 4.5% (groups 3 and 4) protein. Beginning on day 15, animals in groups 2 and 4 received 0.4 mg/kg body mass of T-2 toxin in 1% aqueous ethanol. The animals were sacrificed 64 hours after the last administration of toxin and the activity of 4 lysosomal hydrolases determined in liver, spleen and thymus homogenates and in blood serum. The nature of changes in the level of lysosomal and rat liver peroxisomal enzyme activity were similar in both the case of protein deficiency and of intoxication with low doses of T-2 toxin. In both cases, there was an increase in the functional activity of the lysosomes and suppression of the peroxisome enzyme activity. The increased level of changes in lysosome and peroxisome enzyme activity may result from reinforcement of protein deficiency or reinforcement of the toxic effect of the T-2 toxin. Figures 2, references 14: 10 Russian, 4 Western.

06508

Structure and Biological Activity of Low-Molecular-Weight Interferon Inducers

18400164b Moscow ANTIBIOTIKI I MEDITSINSKAYA BIOTEKHNOLOGIYA in Russian Vol 32, No 9, Sep 87 (manuscript received 24 Dec 85) pp 706-715

[Article by N. P. Chizhov and M. A. Borisova, Military Medical Academy imeni S. M. Kirov, Leningrad]

[Abstract] This review of the literature focuses on the relationship between chemical structure and biological activity of low-molecular-weight interferon inducers in an attempt to reveal possible mechanisms of action of these substances. This information would be useful in the search for more effective preparations. Substances discussed include 2,7-Bis[2-(diethylaminoethoxy)fluorene]-9-one dihydrochloride (tiloron), quinoline derivatives, acridines and thiazines, pyrimidine derivatives, diamine derivatives and unclassified compounds. The chemical structure and interferon-inducing activity of these interferon inducers are presented in tabular form. Many of the inducers studied bind with DNA molecules, forming high-molecular-weight polymeric active complexes. Consequently, a stable, active inducer molecule may be created by interaction of the low-molecular-weight compound with specific sequences of nucleic acids in the presence of polyamines. References 20: 2 Russian, 18 Western.

06508

Neurochemical Mechanisms of Delayed Neurotoxic Effect of the New Fungicide Afos

18400164c Moscow GIGIYENA I SANITARIYA in Russian No 10, Oct 87 (manuscript received 4 Mar 86) pp 73-75

[Article by U. A. Kuzminskaya, V. F. Shilina, L. V. Bersan and L. M. Veremenko, All-Union Scientific Research Institute of Hygiene and Toxicology of Pesticides, Polymers and Plastics, USSR Ministry of Health, Kiev]

[Abstract] A number of organophosphorus compounds can have delayed neurotoxic effects with clinical manifestations, including paralysis arising 16 to 18 days after administration of the preparation and demyelinization of central and peripheral nerves. This article describes the biochemical changes in nerve tissue in the process of development of delayed neurotoxicity caused by administration of the new fungicide afos. Experiments were performed on chickens which received the preparation orally at 200 mg/kg. Morphologic studies of nerve tissue were performed 7-8 and 18-20 days after administration of the substance. Biochemical changes were observed in the early stages, many of which were reinforced during the stage of paralysis, including a decrease in the quantity of cerebrosides. The content of gangliosides remained practically unchanged. Spinal cord cholinesterase activity decreased and remained low throughout the entire experiment. The activity of K, Na-ATPase in the brain and spinal column first increased, then decreased. The mechanism of development of delayed neurotoxicity features a decrease in the level of serotonin and inhibition of cholinesterase activity in the early stages, the increased K, Na-ATPase activity being a protective-/compensatory reaction. The lipid composition also changes, indicating developing demyelinization. As clinical paralysis develops, inhibition of K, Na-ATPase becomes significant. References 11: 5 Russian, 6 Western.

06508

Changes in Cerebral Electrical Activity of Cats After Intravenous and Cerebroventricular Administration of Oxytocin

18400076 Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 127, No 1, Jul 87 (manuscript received 21 Dec 85) pp 153-156

[Article by E. S. Moniava, Z. S. Khanayeva, M. P. Butskhrikidze, and I. A. Tsomayya, Institute of Physiology imeni I. S. Beritashvili, Georgian SSR Academy of Sciences]

[Abstract] The effect of synthetic oxytocin on central nervous activity was investigated in 27 unanesthetized cats, which were immobilized with tubarine. Concentrations of 1 μg/0.1 mL were used for intravenous administration, while 25-100 ng/0.1 mL were used for intraventricular injection. In about one-third of the animals intravenous hormone at doses from 0.5 to 50 mg per cat weight had no effect on the electrocorticogram. In the other animals changes of long duration were elicited, with initial activation followed by prolonged synchronization. Return to the original state took 40-60 minutes. The observed effects were often extinguished by larger doses. In intraventricular administration, synchronization began 1-2 minutes after injection, accompanied by generalized, dose-related epileptiform activity. After 20-30 minutes the response weakened, with several short periods of renewal. Return to background took 40-60 minutes. The results indicate that introducing physiological doses of oxytocin causes profound prolonged changes in the electrical activity of the primary sensory and associated areas of the cerebral cortex. Figures 3; references 8: 3 Russian, 1 Hungarian, 1 Czech, 3 Western.

12126

Biorhythms of Binocular Vision

18400183a Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 13, No 5, Sep-Oct 87 (manuscript received 3 Mar 86) pp 779-782

[Article by T. P. Teterina, V. V. Volkov and L. P. Kochetkova, Semipalatinsk Medical Institute, Military Medical Academy imeni S. M. Kirov, Leningrad]

[Abstract] Study of rhythmic processes in the body (biorhythmology) is now quite important in the clinic, in labor physiology and in space medicine. Apparently, the literature contains no reports involving study of biorhythms of high-frequency visual functions lasting from 1 microsecond up to 30 minutes. This study of biorythms of monocular perceptions in an act of binocular vision with bifixation of a fixed object under natural conditions of free space involved 85 men and 102 women (ranging in age from 10-25 years) with normal vision. Subjects wore spectacles with light filters of supplementary colors (red over one eye and green over the other), making it possible to differentiate monocular perception during bifixation of one and the same object. During bifixation of a fixed object under natural conditions of free space, the subjects displayed synchronized alteration of monocular perceptions. The mean frequency of the rhythms was 10.9 plus or minus 0.3 per minute; the duration of one period was 4.78 plus or minus 0.18 s and the duration of the phase of monocular perception ranged from parts of a second up to 1-3 s. The daily rhythm of monocular perceptions established showed an increase in frequency in the morning and a decrease in the evening with the length of one period changing accordingly. The freqency of the rhythm depended on the sex, age and other individual characteristics of the subject and on environmental conditions. Biorhythms of monocular perceptions in the act of binocular vision, according to Halberg's classification, belong to the group of high-frequency biorhythms and may be caused by metabolic features of biological systems. References 16: 12 Russian; 4 Western.

02791

Dynamics of Sensorimotor and Mental Activity in Adaptation to Hypoxic Hypoxia and Submaximal Physical Stress

18400183b Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 13, No 5, Sep-Oct 87 (manuscript received 9 Dec 86) pp 850-852

[Article by A. Yu. Shikin and I. L. Solomin, Military Medical Academy imeni S. M. Kirov, Leningrad]

[Abstract] Traditionally, hypoxia is considered to be an unfavorable factor which reduces the quality of work of an operator. It is also known that intense physical work produces hypoxia and reduces mental efficiency. It is not known what forms of operator activity are most sensitive to repetitive hypoxic stress during intense physical exertion with reduced partial pressure of oxygen in the expired gas mixture. In view of this, an explanation of the nature of changes of different forms of operator activity in the process of adaptation to submaximal physical exertion and hypoxic hypoxia was presented. The study involved 90 observations of 10 healthy males, ranging in age from 23-38 years. Each subject participated in 9 daily observations. The types of operator activity examined were: sensorimotor activity for control of a dynamic object [SMA] and psychomotor activity with pronounced stress on operative memory and arithmetic calculations. Submaximal physical exertions produced a significant increase of stability of SMA in the first series of observations, with some individual differences. SMA decreased under conditions of hypoxia in the second set of observations. No significant changes of stability of SMA occurred from the 3d to 7th day. Adaptation of activities to submaximal physical exertion and hypoxic hypoxia occurred on the 8th day regardless of the level of physical efficiency. Changes of rate and quality of psychomotor activity did not occur. References 9 (Russian).

02791

Method for Observing Changes in Functional State of Human Operator

18400183c Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 13, No 5, Sep-Oct 87 (manuscript received 13 Sep 85) pp 863-865

[Article by B. M. Vladimirskiy and L. A. Vlaskina, Scientific Research Institute of Neurocybernetics, Rostov State University, Rostov-on-Don]

[Abstract] A method of diagnosing the functional state of a human operator was developed and checked experimentally. Correlation coefficients of instantaneous values of EEG amplitude, recorded in three symmetric zones of the cerebral cortex, served as starting material. Correlation coefficients (4-6 out of 15 possible) which differed the most in their mean values during transition from one functional state to another were used. Construction of a correlation coefficients matrix for correlation coefficient values selected at the preceding stage and subsequent analysis of the main components revealed change of functional state with great accuracy. Indicators of time-space organization of EEG activity revealed in the diagnosis were individually stable and can be used to construct psychophysiologic portraits of specific operators. Tracking the functional state of a human operator during fatigue development was used to check the effectiveness of the method. Figures 1; references 5: 4 Russian; 1 Western.

02791

Implantation of Embryonal Cerebral Tissue Into Regenerating Peripheral Nerve

18400165a Leningrad ARKHIV ANATOMII, GISTOLOGII I EMBRIOLOGII in Russian Vol 93, No 10, Oct 87 (manuscript received 18 May 87) pp 43-49

[Article by Ye. S. Petrova, Ye. I. Chumasov and V. A. Otellin, Laboratory of Experimental Neuromurphology (headed by Doctor of Biological Sciences Ye. I. Chumasov), Department of Morphology (headed by Doctor of Medical Sciences V. A. Otellin), Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad]

[Abstract] A study is made of the morphologic features of embryonal CNS tissue implanted into a regenerating peripheral nerve in mature rats and interaction with the host tissue. Studies were performed on Wistar rats with nerve damage created by squeezing in a clamp. Embryonal material taken from 17-day-old Wistar rat embryos was inserted into the nerve 5 mm proximal to the damage site. The animals were sacrificed 14, 30 and 60 days after implantation for histologic examination of the nerve tissues. The embryonal implants not only retained viability, but also continued development and differentiation. An active process of implant cell element differentiation occurs between the first and second months. The neural elements differentiate to mature neurons of various types, as indicated by changes in the nuclear-cytoplasmic ratio, increases in dimensions, formation of chromatophilic substance and formation of myelin sheaths around developing axons. The vascularization of the implant is important for its survival and development. Individual blood vessels were observed in the implant 14 days after surgery, increasing to a dense network of blood vessels by 60 days. Some of the bundles of regenerating nerve fiber penetrate into the implant and divide into smaller terminal branches. It is difficult to say whether they form receptor endings or end in synapses on nerve cells without further study. Figures 2, references 8: 5 Russian, 3 Western.

06508

Study of Survival of Amygdala Embryonal Tissue Grafts in Various Portions of the Adult Rat Brain

18400165b Kiev NEYROFIZIOLOGIYA in Russian Vol 19, No 5, Sep-Oct 87 (manuscript received 14 Jul 86) pp 606-613

[Article by Ye. A. Luschekina and V. P. Podachin, Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences, Moscow]

[Abstract] Nerve tissue transplant studies may be conducted on the fundamental level, to study processes of neurogenesis, or on the practical level, in which transplantation is studied as a method of compensating for disorders in physiological and behavioral function. This article describes an attempt to restore functions, compensation of which can be based on structural integration of a transplant with the brain of the recipient. The survival of an embryonal amygdala after transplantation into the brain of mature intact rats were studied. Transplantation was performed under sterile conditions using tissue taken from 18-21-day-old embryos, the amygdala and, for comparison, cortical areas. The recipients were sacrificed one and one-half to six months after implantation, and the success of survival of the transplants was assessed by visual and quantitative analysis. Criteria of successful survival included well differentiated nerve and glial cells, the existence of tissue fusion zones, intergrowth of blood vessels and lack of necrotic foci. The success of survival depended on the location of the transplant. The most unfavorable position for development of the transplants in the intact brain was the cortex. The subcortical structures and ventricles were more favorable. Figures 4, references 20: 11 Russian, 9 Western.

06508

Respiration and Oxygen Tension in the Blood of Animals Exposed to High Pressures

18400165c Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR. SERIYA BIOLOGICHESKAYA in Russian No 4, Jul-Aug 87 pp 74-77

[Article by F. P. Tulbayeva, Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad]

[Abstract] A study is presented of the dynamics of the respiratory function and oxygen tension in arterial and venous blood in animals during time spent in a nitrogen-oxygen mixture under high pressure. The experiments were performed on 12 male rabbits exposed for two hours to a normoxic (P_1O_2=0.2 kgf/cm^2) nitrogen-oxygen mixture under a pressure of 40 kgf/cm^2. Respiration frequency and volume per minute decreased sharply during the course of two hours exposure to high pressure. Oxygen tension in both arterial and venous blood gradually decreased over the same time. Survival times of the animals varied, but all died from asphyxia during the course of the experiment. It is suggested that the high density of the gas being breathed increased respiration resistance, causing a decrease in pulmonary ventilation and resultant oxygen deficiency. Figures 2, references 5: 3 Russian, 2 Western.

06508

Blood Shortages in Georgia Result in Speculation

18400250a Tbilisi MOLODEZH GRUZII in Russian 24 Dec 87 p 3

[Article by Yu. Simonyan: "How Much Does a Drop of Blood Cost"]

[Text] "Well?" the large-framed man with multiple needle marks on his arms, which evoked thoughts of his rough past, asked of a young fellow who already had a puffy, red face.

"Fifty," answered the young man reluctantly and with some sort of guilt.

"Give me a chervonets [10-ruble note]," blurted the first.

The young man sighed and handed him ten rubles.

A woman appeared at the end of the corridor. The roving glance of the large man stopped on her perplexed face.

"Do you need much?"

"Four hundred," whispered the woman.

"Eighty!"

"That's a lot," she said, as she looked imploringly into his greedy eyes.

"Seventy, and that's it!" the man said, softening his demand.

The woman agreed. The man called to someone who had been hiding behind the door. That person came in and gave the woman a piece of paper—a certificate, apparently—and then recounted the money and handed the large man a ten.

It is time to explain, however. That is not a retelling of a detective film—the action takes place at the city blood-donor facility that is located on Kamo Street.

Most of the people that are crowded into the corridor are donors—the rest are those who need blood. The donors, it's true, are strange—faces that are sort of flabby, swollen, red, with blank stares; many of them exude the stale smell of alcohol. The large man with the needle marks is their leader. He speaks with authority and considers himself the boss. For a chervonets he saves the donor the fuss and finds a "client" who needs to give blood but, for some reason, is avoiding it. Like the woman from whom the donor took the 70 rubles, for example. She had a severely ill infant. The infant was going to have an operation, and the woman needed to give 400 grams of blood.

"I can't give it—I'm sick myself," she says, and she begins to tell about her own illness.

"How did you find out that you could arrange it?"

"My neighbor told me, and so did the doctors."

About ten minutes go by. The sweeping gaze of the donor "ringleader" snatches out a young man. For fifty rubles one of those standing in the corridor disappears behind the same door.

"My wife had a baby," explains the lucky father, waiting for a certificate that says he just gave blood. "They need this in the maternity home. They won't discharge her, they say, until I give blood. Could that be right?"

"Why don't you give it yourself?"

"I'm afraid," he smiles, playfully flexing his biceps...

The scene repeats itself the next day. In the same corridor. The same swollen faces of the donors, the stale liquor smell. Only the petitioners are different. They have various reasons for coming to the blood-donor facility. Most of the time it is for sick relatives. Some give blood themselves; others—the faint-hearted or those who are not quite healthy enough—prefer to make arrangements with the donors, who are ready give aid for a sum. It may seem that everything is alright, they are all there voluntarily. But still a worm gnaws away inside: here are people with a misfortune, and the donors, it turns out, are "extorting" money from them. The notion of donorship as something noble, almost altruistic, collapses.

"I'm not forcing anyone—they come here on their own," counters one of the donors with the eyes of an albino rabbit.

"But the man has a misfortune, and you..."

"I'll tell you what misfortune is—it's that whatever you ask, that's what he'll give!" explains the donor.

Which is rather frank and cynical for the generally accepted image of a donor.

"What do you mean—donors?! They're not donors, they're scum! I've had it up to here with them!" says the facility's head physician, Karlo Varlamovich Bordzhadze, as he brings the edge of his palm up to his throat. "And we can't do a thing about it. They're not stealing, they're not robbing anyone, they're not speculators—in a word, they're not breaking any laws. At every opportunity, they beat their breasts and shout, We're, they say, donors! You explain what donorship is about, and the guy says, 'It's my blood, and I'll do whatever I want with it.' So you try to appeal to his conscience, and he laughs in your face."

These "donors" came on the scene long ago, about the time the blood shortage began. The shortage is not trifling—every year, Tbilisi is short 2-3 thousand liters of

blood. They don't have the components for manufacturing certain medicinal preparations. For that reason, an unwritten law has taken effect: they force the relatives of women in childbirth, the relatives of people who are about to have an operation, to give blood. But what can be done? In both cases—less often in a woman in childbirth, but almost always in surgical patients—blood is needed, and since the blood-donor facility inventories are not unlimited, you've got to make up for it somehow. Eliminating the shortage right now is impossible—there are catastrophically few donors. That's odd, because giving blood is absolutely safe. It only takes a week to completely replenish 500 grams of donated blood! And not only is it safe—just the opposite, it's healthy: it renews the blood in the body; the organs that produce the blood work more intensely; and the restoration of the body's blood supply is, figuratively speaking, like gymnastics for the liver and the spleen.

But still, where then do you get blood—there are maybe a little more, maybe a little less, than 13,000 liters in the clinic.

"Our mobile clinics—which set up periodically in plants, factories, and higher education institutions—provide a great service," says K. V. Bordzhadze, "although they're not without their problems..."

In fact, at the plants, there are plenty of problems with giving blood. Sometimes, it doesn't matter if a worker wants to give 250-300 grams of blood—everything there depends on his direct superior. And you can understand: his superior doesn't want production to lag because the worker has to rest for two days after giving blood, and so the OK to give blood goes primarily to the less outstanding workers, with their approval, of course.

"And with the students, it's wretched," laments Karlo Varlamovich Bordzhadze...

And his complaining is totally justified. It's only with the TGPI im Pushkin [Tbilisi State Polytechnical Institute] that he has no grievance, a polytechnical institute. In the remaining institutes—and, as paradoxical as it may be, in the medical institute—there are practically no donors!

There are extremely few active donors, that is, those who give blood at the rate set by the republic's ministry of health—400 grams for 25 rubles. Unpaid donors are almost nonexistent. Since the "donors" gathering in the clinic do not receive money from the government, are they, therefore, formally considered unpaid donors?

Karlo Varlamovich's answer is more than categorical: "Scoundrels and villains maybe, but not unpaid donors!"

"And what if the state rate of 25 rubles were raised to 50?"

"Lines would form!" the head physician assures me. "But the ministry cannot pay that kind of money. There are other ways of solving the problem. Many countries, for example, make it mandatory by law for relatives of those giving birth to give blood. Why not establish that strict law here—then the complaints of the relatives, which are not that rare, would disappear. Or, let's say, before receiving a driver's license, make it mandatory for the auto enthusiast to give some amount of blood—why, serious highway accidents are not rare."

Besides, the blood shortage problem has become so severe that we may have to open an account for voluntary donations from the public to benefit the donor movement. It has long been time to make membership dues to the Society of the Red Cross, which is directly affiliated with the donor system, strictly and universally compulsory. You could raise the dues by as much as, say, 50 kopecks—an amount that is quite within the grasp of every individual.

Then we could pay 50 rubles for 400 grams of blood, and then watch how they would "line up." No matter what anybody says, even 50 more rubles for their stipend certainly would not hurt those same students. Then we would have all the blood we need, and the questionable "donors" wouldn't be crowding around at the blood-donor facilities. And then instead of going to the merchants for the blood-plasma preparations that you need, you could go to the pharmacy!

But enough daydreaming. Or rather, for now it's daydreaming—but it's quite feasible.

"Feasible," agrees Karlo Varlamovich Bordzhadze.

But if that's the way things are, then the republic health ministry certainly needs to think about the situation that has developed—it has practically nothing to lose.

Not for nothing is it indicated in the resolution of the CC CPSS titled Basic Guidelines for Protecting Public Health and Restructuring Health Care in the 12th Five-Year Plan and in the Period Up to the Year 2000: "We must take specific measures to develop the blood service and to encourage the donor movement."

And until that happens...until that happens, it will be that same scenario: a confused, dispirited man comes up, and an authoritative voice bellows:

"Eighty...Seventy, and that's it."

"What can I do, there's no alternative," softly sighs the "client," who then counts out the chervonets for a "donor" with a puffy red face.

13227

Georgian Ministry of Health Response to Blood Donor Situation

18400303 Tbilisi MOLODEZH GRUZII in Russian 18 Feb 88 p 6

[Responses to article "How Much Does a Drop of Blood Cost?"]

[Text] An article published under this caption appeared on December 24, 1987. The editors received a response from the republic's Ministry of Health signed by Deputy Minister O. Gerzmav which stated : "The Therapeutic and Prevention Administration of the Georgian SSR Ministry of Health has looked into the facts stated in the article and those facts were confirmed. Certain employee donors at the Tbilisi City Transfusion Center have been giving blood for relatives of patients from whom they have been receiving monetary compensation far in excess of the amounts officially allowed by existing standards. Certain groups of employee donors have also been reselling donor certificates.

It has also been established that the city blood transfusion center has systematically requested the internal affairs department of the Oktyabrskiy Rayon and other organizations to undertake measures with respect to the "second-hand dealers" of blood. However, effective measures were not undertaken because the donors are not subject to legal accountability.

The Georgian SSR Ministry of Health held a special conference at the city transfusion center to which supervisors from transfusion departments at Tbilisi city hospitals and maternity homes. All of the negative phenomena mentioned in the article "How Much Does a Drop of Blood Cost?" were thoroughly discussed and measures were outlined to eradicate them. The City Blood Transfusion Center was warned that purposeful and explanatory work concerning blood donor activities among the capital city's populace is still being poorly implemented, particularly among relatives of patients. Employees at the hospitals, maternity homes and the blood transfusion center must convincingly explain to patients the humanitarian principles and safety in the giving of blood and convince them to give blood voluntarily. At the same time officials at the city transfusion center must ascertain why employees are making blood donations for relatives of patients without compensation. If such activity is due to commercial motives, this kind of blood transfer must be categorically halted. The city blood transfusion center was also advised to adhere more strictly to the "Instructions for the Medical Certification of Donor Blood" and that it should not allow alcoholics to give blood.

The Tbilisi gorispolkom health administration has been ordered to intensify its control over the operations of the Tbilisi city transfusion center and the struggle against negative phenomena and violations of the humanitarian principles underlying Soviet blood donations.

In that connection we believe it is essential to note that the article "How Much Does a Drop of Blood Cost?" contained a few inaccuracies. The article pointed out that there were no donors at the Medical Institute whereas in fact 2,300 out of the 5,200 students at that institute gave blood in 1987. That figure is the highest student donor ratio in the country. The assertion of the article's author that the charge of 25 rubles for 400 grams of blood was established by the republic's Ministry of Health is not correct since the compensation for donated blood has been fixed by the USSR Ministry of Health.

The author's suggestions about increasing the amount of compensation for donated blood and about legalizing the obligatory donation of blood by patients' relatives, truck drivers, and others, warrant our attention and will be brought up for discussion before national-level organizations."

Pursuant to the publication of responses to the article "How Much Does a Drop of Blood Cost?" of January 21 of this year, the editors received a letter from Chief of the Donor Department of the City Transfusion Center A. Patarnidze who wrote: "Having read the response in the January 21 issue to the article 'How Much Does a Drop of Blood Cost?' in which some citizens share their views about violations of instructions concerning the medical examination of donors, I wish to inform you that a donor who is accepted for blood donations undergoes a medical examination by a general practitioner and a hematologist.

If there is the slightest suspicion about possible contraindications, and particularly if the donor is inebriated, such a person not allowed to give blood.

It is possible that one can encounter citizens who happen to be intoxicated in the area of the city transfusion center, but that does not mean that they are giving blood. I have been working in the blood donor division for 22 years. Not once have I seen a situation where a donor was allowed to give blood while in an intoxicated state."

6289

Hepatitis B Transmission in Belorussia

18400257 Minsk SOVETSKAYA BELORUSSIYA in Russian 27 Jan 88 p 4

[Article by A. Lemeshenok: "Dangerous... Blood"; first two paragraphs are SOVETSKAYA BELORUSSIYA introduction]

[Text] In court practice a lawsuit against a medical worker, who treats a patient unprofessionally and unobjectively, is rare. In essence, this reflects the true state of affairs. As a rule, people in white gowns do everything that depends on them to give competent help to those under their care. Words of gratitude addressed to them are often heard and appear in the press.

However, this does not at all mean that there are no other voices... For example, the hundreds of people that only recently have turned out to be suffering from serum hepatitis—suffering not at all through their fault or carelessness—can hardly join such a chorus "to their health."

Letters and telephone calls from readers suggested the subject and addresses of this report. Some, for example, pensioner A. Zaytseva from Bobruysk, is disturbed by the following question: Is the possibility of infection with AIDS during injections owing to physicians' negligence ruled out? Others raise the matter of donors—to what extent is the quality of their selection ensured? There are also other aspects of the problem.

First address. A clinical hospital for infectious diseases is located behind a high fence on Kropotkin Street—almost in the center of Minsk. The first patients, in whom the AIDS virus had been discovered, came there.

"The examination was conducted strictly according to existing methods," Vladimir Yevdokimovich Kazak, the clinic's chief physician, says. "All the procedures were performed with disposable syringes and needles, which were then destroyed. Under our conditions any possibility of infection with the dangerous virus is ruled out."

This is only one—the most insignificant—aspect of the clinic's work. It is well known that so far only a handful of carriers of the "plague of the century" have been discovered in the republic. Patients suffering from hepatitis (in everyday usage this disease is called jaundice) represent the main contingent of this medical institution. More than 1,000 patients underwent treatment there last year. Hepatitis patients represented the overwhelming majority of them. However, there were also those that suffered from serum hepatitis, or hepatitis B.

For information: The hepatitis B virus is mostly introduced during injections with poorly sterilized syringes and needles, as well as with the donor's transfused blood.

Science has also established natural ways of virus transmission.

Hepatitis B, as compared with hepatitis A, is more serious and fraught with complications.

Second address. A fuller picture of the spread of this disease can be obtained at the city sanitation and epidemiological station. After a brief talk with Viktor Mikhaylovich Chelnov, Minsk's chief state sanitation specialist, who expressed concern about the present state of affairs, I went to the appropriate department at the station. Larisa Vasilyevna Boyko, its head, was just entering the data on the past year into the report. Unfortunately, they were not comforting. More than 5,000 Minsk residents suffered from hepatitis. A total of 431 out of them suffered from serum hepatitis—so many people turned out to be innocent victims. Most of them were let down by the imperfect method of processing syringes, needles, and other materials and in some cases by the negligence of medical personnel as well. Is someone responsible for this?

"Each such case," Boyko says, "is investigated carefully. It is not simple to identify the culprits because the incubation period of the disease lasts up to 6 months. Nevertheless, in many cases it is possible to ascertain at what hospital the infection occurred. Such medical institutions receive penalty points, which affect their position in the socialist competition."

It appears that this is all. The circle is closed. The many-sided clinic in a single person is to blame. At best a department can be singled out. As is well known, however, a department has more than one worker. Here all the clues come to a complete end. Of course, the clinic that has acquired penalty points is able to rectify the situation in the competition through other indicators. But how is the patient to rectify the situation? Only through treatment...

Perhaps this figure (431 people) does not seem so bad? Especially as in medical statistics it is customary to adjust many indicators per 100,000 people and not to denote them in an absolute quantity. Then the data on hepatitis B will seem even more modest—27.5. However, people rightly say that it is six of one to half a dozen of the other. No matter how one manipulates the figures, serious damage is annually done to the health of hundreds of people (and this in Minsk alone). In brief, the treatment of one such patient, on the average, costs the state about 1,500 rubles.

Third address. The Republic Blood Transfusion Station is located in a comfortable place on the outskirts of the city. Dozens of donors come here every day. They have all the [necessary] conditions here: clean offices for examination, comfortable halls for rest, and a snack bar, where they can fortify themselves. Information can be obtained without standing in line. The first impression of this institution is most favorable, if, of course, one does not know the other side of the coin...

Many enthusiasts, experts at their jobs, work at the Republic Blood Transfusion Station. Through their efforts the collective looks quite well among similar institutions in the country. It is among the leaders. Whereas the Central Blood Transfusion Station in Moscow by no means always fulfills the plan for the production of such a valuable blood preparation as albumin, the people of Minsk cope with it 100 percent and more. They were the first in the country to introduce a single donor center at the republic station headed by Candidate of Medical Sciences Lev Vasilyevich Ivanov. In many cases this makes it possible to put up a barrier against bad

donor blood. Telegraphic apparatus, which make it possible to promptly contact other donor centers and to identify through a card file violator donors, as well as donors kept away from giving blood for various reasons, have also been installed.

Local experts have made many devices, which have been of help in the work on the production of various blood components for more than one year.

On the whole, however, the equipment used at the station is hopelessly obsolete. With L. V. Ivanov we visited numerous offices, laboratories, and sections and here and there we saw a bleak picture. There were massive inconvenient centrifuges at one place and equipment made by a Lvov enterprise, which broke down as soon as it was put into operation, at another. An installation for the production of... dairy products adapted for the station's needs "functioned" at still another place.

However, the main trouble is in another matter. Today virtually all blood transfusion stations, like the Minsk station, use long obsolete methods, which in no way guarantee a product free of the hepatitis B virus. Even the most advanced out of the three applied methods—passive hemagglutination reaction—reveals only 60, at the maximum 70, percent of the "rejects". This is the main sore spot. After all, 1 milliliter of "sick" plasma per 100 liters of "healthy" plasma is sufficient to infect [people] with the same viral hepatitis.

Is this really a deadlock? No, there are already modern methods developed in many countries throughout the world for the identification of various viruses in the blood. True, in our country they are considered very expensive. But should we save in this case? Moreover, do we save?

However, the essence is seen not only in this. This is rather the consequence. Many specialists, including the chief physician at the Republic Blood Transfusion Station, see the cause in something else. In their opinion, the blood service is entangled in the archaic orders and instructions of the USSR Ministry of Health, which republic ministries are forced to copy and duplicate in one way or another. Having studied them, it is easy to become convinced that this is so. Even those dating from 1986, in essence, have become copies of previous orders and instructions published 20 years ago or more. An amazing fact! There is a great deal of talk about restructuring in medicine, but there is the same resistance to change here...

It is sad to talk about this, but today the republic station does not even have sufficient inexpensive plastic bags for the procurement, processing, and storage of its product, not to mention more "serious" equipment. And if this is the situation at the country's leading stations, it is not difficult to imagine how the blood service degenerates in localities.

The following question is in order: Need we restrain ourselves by and entangle ourselves in obsolete instructions and forms even if they emanate from above? Now, when initiative, even if it is risky in some way, is no longer silenced, does it make sense to wait and to lose precious time?

One cannot say that nothing is being done in this direction in the republic. Problems of improving the blood service are, as the saying goes, under control at the Belorussian SSR Ministry of Health. There are quite good plans and developments. I was informed of them. Naturally, the situation cannot be rectified in one stroke. However, a delay is also fraught with serious consequences—hundreds and thousands of new patients.

From all appearances changes in the reorganization of the blood service management system have also come to a head. Recently, such measures have been implemented in Leningrad, Lithuania, and some other places. A number of interesting ideas in this direction were put forward in the republic as far back as 5 years ago by the same L. V. Ivanov, but they were "frozen." If they are unsuitable, or have also become obsolete, then someone should undertake the development of new ones. And not only undertake, but act, because a cheerful and optimistic view of the problem is now dangerous and harmful. It is inexcusable.

There are many problems. They cannot be illuminated in one report. For example, the subject of donorship requires a separate and serious discussion. And not only this. We hope that specialists working in this area will share their views on this score on the pages of this newspaper. There are many of them in the republic. The newspaper's readers can also have their say.

11439

Self-Financing Experiment in Soviet Health Care

18400305 Moscow IZVESTIYA in Russian 9 Mar 88 p 6

[Article by L. Ivchenko: "Health on the Scale of Self-Financing"]

[Text] By an order of the USSR Ministry of Health three regions of Russia — Leningrad and the Kuybyshev and Kemerov oblasts —will transfer to fundamentally new methods of operations in the public health sector. The essence of this experiment is that public health institutions will be endowed with the rights of state industrial associations and their interrelationships will be based on self-financing. How will this look in actual practice?

"Medical institutions will be organized into territorial associations which will be headed by a polyclinic," said V. Kalnin, Chief of the Main Administration for Therapeutic-Preventive Assistance of the USSR Ministry of Health. You see, it is at the polyclinic where the "center of gravity" will be concentrated. The polyclinic will also

receive money that is allocated to the territorial associations and then settle accounts with its "companions" — the hospital, "First Aid" operations, diagnostic centers, and dispensaries. Moreover, a bill will be prepared for each patient.

Now that the polyclinic will become the distributor of all funds it will have a vested interest in keeping as much of the funds as possible for itself. But the polyclinic must earn that money! And to do that, it must develop new forms of serving its patients. Under the present organization of medical services it is no secret that a physician discharge his patient as soon as possible. So we have a situation where a person runs from one consultant, dispensary, or institute to another... Now just the opposite will be the case. Each individual facility will strive to accord all the possible assistance it can within its premises. Why should a polyclinic pay for consultation if it can have its own specialists? Physicians will want to raise the level of their skills so that they can be become specialists over a broad range of areas.

The same will be true of the permanent hospital. A polyclinic will hardly hasten to send a patient to a hospital if the patient can be treated as an out-patient case. We now have a paradoxical situation in the country. We have the highest per capita hospital bed ratio in the world — over 130 per 10,000 population, but one cannot get into a hospital. Hospitals are clogged with patients "not indicated" for hospitalization. Almost half of the patients being treated are persons for whom hospital treatment is not indicated.

Incidentally, the desire to earn as much as possible will stimulate polyclinics to organize their own diurnal hospitals and house call services. There has already been some good experience in this area , particularly in the Ukraine. Many patients, especially women, are very happy about being able to obtain complete, essentially hospital treatment without having to tear themselves away from their home and family.

The hospital, in its turn, must earn money for its own subsistence. Therefore, it will automatically strive to shorten the hospital stay of patients through the application of more intensive treatment since the staff of a hospital will earn money for every cured patient, and not for the number of hospital bed days used as has been the custom. Under the existing conditions in our country the number of hospital days spent by patients is one-third higher than it should be, and that is because patients are not being treated in the way they should be.

The principal goal of the experiment is to make a marked improvement in the quality of medical services and to find new economic levers for that purpose. After all, everyone understands that it is simply impossible to manage the public health sector by the previously applied methods. The conventional wage increases, and if my memory is correct the last increase was the third one, will also yield nothing because what we have in practice is wage-leveling whereby both the good physician and the negligent ones get wage hikes. The experiment then will enable us to differentiate the individual contribution made by each medical worker.

And what do the experiment's participants themselves think about this? Here are the comments of Chief Physician of the Kuybyshev Oblast Hospital imeni M. I. Kalinin V. Seredavin:

"In the first place, no matter how large our working staff, the entire wage fund stays with us. This allows us to shift the staffs as we see fit and raise the wages of conscientious workers by reducing certain staff positions. In the second place, the experiment calls for the progressive labor formation of a brigade detachment. Consequently, various wage hikes, prizes, etc., will significantly increase the wages of the medical personnel.

This is a new, unconventional undertaking. Will it turn out to be a promising one? Will the patient be forgotten as a result of the medics' striving to earn more money? Will there not be new twists in the form of artificial obstacles to hospitalization, appointments with consultants, discharges from hospitals, etc.? The organizers of the experiment maintain that the correct criteria of evaluation must operate for the welfare of the patient and the health sector. For example, if a physician is in hot pursuit of immediate profits, then he will soon "go broke" because he will receive a chronically ill patient for whose treatment an institution will have to spend much more. In the process of this operation the experiment's advantages and shortcomings will become apparent and there will probably be corrections and adjustments.

6289

Measures Adopted by Health Ministry to Accelerate Innovation

18400251a Moscow IZVESTIYA in Russian 29 Feb 88 p 1

[Article by S. Tutorskaya: "In Order to Give Faster and Better Treatment"; first paragraph is IZVESTIYA introduction]

[Text] A series of important resolutions concerning medical science and medical care for the population have been adopted by the board of the USSR Ministry of Health.

Does the physician need new, effective methods of treatment, new medications? The question, it would seem, is strange: of course those things are needed.

But here is what researchers from the All-Union Scientific Research Institute of Medical Information turned up in a survey conducted last year of physicians in the Kursk, Pskov, and Smolensk oblasts. Of the two thousand physicians who answered the questions on the

questionnaire, nearly half have not introduced anything new over the last two years. And of the physicians who showed some initiative, only about 9%"armed" themselves with radical innovations that made it possible to drastically improve diagnostics and treatment.

Let us not make rash judgements and immediately divide the respondents into good and bad. The physician is overloaded with his treatment tasks and with unnecessary scribble. This does not facilitate creativity. Nor do hospital administrations encourage interest in what is new (according to the data of the survey, only 8%of the physician-innovators found support and understanding among their head physicians). And that is not all: if a physician introduces new methods of treatment, it is not taken into consideration in the certification process (?!) and he receives no bonus for it.

Often it can be difficult for the physician to choose just what to introduce. People are giving him any number of recommendations, loads of new methods and medications. But experience shows that far from all of them are actually effective. How can he avoid making a mistake and choose what is reliable if the physician himself has voluntarily taken on additional work?

These and other questions were discussed at a recently held session of the board of the USSR Ministry of Health. As everyone knows, committees of experts are being formed right now in medical science. One of their aims will be to develop an expertise on new developments. Determinations will be made by independent experts chosen for a term of two years. This will help the physician overcome the difficulties of choosing what to introduce first.

In order to materially reward the labor of physician-innovators, the ministries of health in the union republics will create special funds. Awards from those funds will go to physicians and entire medical collectives who improve the state of health of patients by introducing scientific and technical innovations into the treatment process.

And there is another bit of important news. Regional centers that will concern themselves with introducing what is new in medicine are slated to open in eleven cities in our country—Moscow, Leningrad, Minsk, Kiev, Kharkov, Tbilisi, Chelyabinsk, Tashkent, Novokuznetsk, Irkutsk, and Kazan. Here the physician will be able to find qualified advice and support and will be able to assess the technical aspects of the introduction. The centers will be based at institutes for advanced training of physicians. They will have new medical equipment and new drugs. "Introduction firms" attached to the centers will operate on full cost accounting [khozraschet] and will be based on the needs of the different regions of the country.

Deputy Minister of Health I. Denisov, who had explained all these changes, was literally buried with questions by the participants of the board session. And the last question did not worry anyone: where are we going to get the personnel for these new centers? To this, everyone answered: the personnel are around. It has been decided now to close a number of inefficient scientific laboratories whose researchers (often through no fault of their own) conduct unimportant research. Thus freed, these specialists will work in the introduction centers under the direction of the leading scientific institutes in the country. The committees of experts will determine the "social order" and the kinds of introduction that will be made.

13227

Computerized System at Moscow City Polyclinic

18400251b Moscow PRAVDA in Russian 28 Feb 88 p 3

[Article from TASS: "Physician, Patient, and Computer"; article appears under rubric "Moscow Report"; first paragraph appears in boldface in source; second paragraph is photo caption with attribution]

[Text] The Moscow City Polyclinic No. 2. After taking my place in line, I ready myself as usual for a long wait to see the doctor. But this time, I make it into the examining room unusually quickly. And that is where everything becomes clear. On therapist L. Shutova's desk I see a monitor, and on the screen I see a page from a medical chart. The screen shows the dates a patient saw the physician, the reasons, the results of analyses, the medications being taken, and the findings of the specialists.

District therapist Larisa Shutova familiarizes herself with the necessary information on her computer monitor before she leaves to make a house call. Photo by R. Denisov (TASS).

"Really," Larisa Mikhaylovna assured me, "it takes us only a few seconds to get the data on the patient. Oh, we can fill in the patient's history much faster electronically. Our patients no longer stand in line at the registration office, and they do not have to wait as long as they used to to see a doctor. And if someone has to see another specialist, his records no longer "roam" from one office to another. You press a button, and they are on the screen in your office."

The City Polyclinic No. 2, which became computerized this month [February], is not the only medical facility in the capital with an automatic control system. There are users in the Krasnopresnenskiy and Cheremushkinskiy sections, too.

"Following the example of the World Health Organization, screening tests that are rather widely used in our country by physicians at polyclinics and sanatoria," said one of the organizers of the new program, V. Ilin. "But

they were based on the patient interacting directly with the computer. And the answers the people gave to the questions the computer asked were, to put it mildly, subjective. You may honestly believe that something is wrong with your heart, when in fact it may be an attack of intercostal neuralgia, myositis, or something such as the onset of pneumonia. There is nothing odd about that—the patient is not in a position to diagnose himself or to evaluate all the symptoms objectively."

For that reason, it was decided to drop the dialog between patient and computer and switch over to a "physician-computer" interface, not asking the computer to think for itself, of course, or to make diagnoses or set up a plan of treatment for the patient. Modern technology should merely free specialists from routine bureaucratic work, free them to be able to make an unhurried, thoughtful, creative search for the best solutions and to be attentive in their contact with the patient.

The physicians found allies who helped them set up a computer center equipped with domestic computers. They were mathematicians from one of the scientific-production associations and specialists from the Institute of Electronic Control Machines.

The physician inputs information at a video terminal (monitor), and a reply to the request, with a printout, can be presented either entirely or partially for any date, for any given parameter. A magnetic tape archives with virtually unlimited capacity has been set up to store data that is more than five years old.

"Of course," recalls the polyclinic's head physician G. Moiseyev, "introducing the automatic control system did not happen, as they say, 'without a hitch.' There was an emotional barrier. But now none of our people are against using the computer—every single one is capable of carrying on a dialog with it."

In fact, with electronic, ultrasonic, and laser diagnostic and treatment tools in his arsenal today, the physician simply does not have the right to waste his time and energies on writing out thick, paper volumes! That is why the experience spoken of here is so valuable. The executive committee of the Moscow Soviet has specifically approved this Poliklinika automatic control system and recommends to the Main Administration of Health that it be used on a wider basis.

13227

Problems in Introducing Computer Technology in Public Health

18400185 Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 10, Oct 87 (manuscript received 13 Jun 86) pp 9-12

[Article by A.F. Gavrilenko, doctor of medicine, M.P. Pavlovskiy, professor, A.S. Sitnik, candidate of technical sciences, and L.A. Shuster, candidate of medical sciences, under the "Managing Public Health" rubric]

[Text] Experience in the development, introduction, and operation of automated information and management systems intended for medical use has been amassed in the Lvov oblast. An automated system for analyzing traumatic injury rates, morbidity, and labor losses [ASATIZ] has been functioning for 3 to 5 years at 12 large industrial enterprises and in 38 treatment and prophylactic institutions in the Lvov state health department system.

In view of the detailed descriptions of the ASATIZ that are available in [1, 2], we will limit ourselves to noting that the system makes it possible to obtain information of a medical and economic nature that characterizes the collectives' morbidity rather completely and that maintains a personal account of the morbidity of workers and their families. The materials, which are prepared with the help of a computer, display the relationship between morbidity and labor conditions (production rhythm, occupation, length of service, etc.), sex, and age. The computer compiles lists of persons who are sick either frequently or for an extended time and lists of clinic cohorts (persons suffering from ischemic heart disease, stomach ulcers, etc.).

The ASATIZ has been used as the basis for creating an automated system for managing periodic medical examinations [ASU PMO]. The computer keeps track of contingents of individuals undergoing examinations, groups them by exposure to a toxic agent that would necessitate a certain amount of laboratory and instrument studies, and also lists the membership of the physicians' commission. The computer uses this grouping as the basis for printing out an examination appointment chart and referrals for all types of research. Between 40 and 50 minutes is required to output referrals for 600 to 700 persons, at a cost of about 50 rubles. Before the physician's examination, the computer formulates a special chart that contains information about the results of studies that have been conducted along with all deviations from the norm and data about illnesses suffered. This information is provided for all those individuals who are referred for examinations. After the examinations have been completed, the computer checks that of all of the physicians' commission's decisions have been carried out [3]. The ASU PMO has been tested at three enterprises and is being introduced in the other enterprises that already have ASATIZ.

An automated system for summarizing and analyzing reports about labor losses [ASUT] in accordance with form No 15 VN [not further identified] has been functioning for over 2 years.

The experience that has been accumulated has thus made it possible to formulate a number of issues whose resolutions are very important in a period when computer technology is being introduced on a wide scale. It is a well-known fact that all existing systems undergo specified changes when they are switched to management information systems and that the management

information system being developed in turn acquires specified constraints of the existing system's operation. It is understandable that optimal decisions are always compromises and that they are far from always easy to reach. This article is intended to make public health care organizers aware of the problems associated with introducing management automation into the public health sphere.

The first issue is that of the professional training of medical personnel and their preparedness for interacting with a management information system. The difficulties entailed in introducing management information systems into industry that arise from psychological barriers have been well examined in the literature. Introducing such systems in public health is even more complicated because medical personnel are less informed about and less prepared to work with computers. Medical institutes do not provide medical students with the necessary training in informatics and computer technology, and the hours allocated for such training in advanced training for physicians are not sufficient (if they are even provided at all) to provide the necessary knowledge.

Our experience in acquainting the head physicians of the central rayon hospitals who are involved in the advanced training programs with the operation of the medical management information systems that are currently operational in Lvov has confirmed that such systems can be introduced much more quickly if efforts are made to stimulate the interest of medical personnel in the systems and provide them with the necessary knowledge about them. Such activities should be geared more toward the practical mastery of the capabilities of electronic data processing for the respective specialists rather than toward general theoretical training. The automated systems that have been developed in Lvov are thus geared primarily toward the medical and sanitary sections and the shop medical services at industrial enterprises. It is obviously advisable that training in the use of such systems be conducted in the advanced training cycles for physicians working in shop sections and polyclinics serving industrial enterprises. The degree to which the aforementioned systems have been prepared has made it possible to organize the program in such a way that, after physicians have completed the advanced training cycle, they can work jointly with specialists from the respective enterprises to introduce the medical management information systems into their daily routine. In this case, the cycle culminates not only with higher training and a mastery of methods of working with specific medical management information systems but also with the provision of software and instructional materials that make it possible to introduce the system at the site.

Other closely related problems include the problem of informing practicing physicians about the presence of operational management information systems, their capabilities and limitations, the requisites for obtaining and introducing them, etc. Information sheets are useful, but they do not solve the problem. Many individuals who have turned to us with inquiries have wanted incidental information. Often, however, it is the representatives of the computer centers at industrial enterprises who turn public health care organizers' attention to the systems and who initiate the introduction of medical management information systems. One obvious reason for this is that physicians are inadequately informed about the systems. Improving the degree to which physicians are informed is a very important task, and in our view, periodically repeated communications about operating electronic data processing systems, their developers and their developers' addresses, etc., should be published on the pages and covers of medical journals together with information about drugs and new books.

We will look at one more problem. The number of medical computer centers [VTs] and computers at therapeutic institutions is relatively small. At the same time, industrial enterprises have a significant potential from the standpoint of computer resources and staffs of qualified programmers and specialists in operating and servicing computers. The computer centers at industrial enterprises can help speed up the wide-scale introduction of computer technology in public health care. The introduction of medical systems at enterprises is only easier when such systems are geared toward maintaining and reinforcing the health of the workers' collectives at the specified enterprises. For this reason, the system that we have developed is intended for industrial plants, production associations, and sectors. Their main users are physicians in medical and sanitary sections or shop services.

An analogous situation exists with respect to the introduction of automated medical diagnosis centers and preventive medical examination departments, whose prototype has been the Zaporozhye Automobile Plant Kommunar. The expenditures necessary to introduce such centers are completely within the means of the powerful enterprises, and the operation of medical systems at the computer centers of industrial enterprises does not generally require additional expenditures. We are therefore proposing that priority be given to developing different medical management information systems and automated information processing systems [ASOI] that are geared toward the collectives of industrial enterprises and designed for operation at the computer centers of these enterprises. Involving programmers from the enterprises in the creation of these systems will accelerate the creation of software for them and improve its quality.

After a medical management information system is introduced at an industrial enterprise, the shop physician becomes its principal user. This physician can easily input information into the computer, and data that has been processed can easily be supplied to him. But most workers at industrial enterprises usually receive medical assistance from two physicians—one from the shop section where they work and one from the territory

section where they live. It is virtually impossible for the latter to obtain information from the plant computer center, and the information that is provided to the computer center data banks by the territorial physician is generally limited to information from a slip indicating a temporary inability to work. One possible and very promising way of solving this problem is to have one individual fulfill the function of the shop and territorial section physician. In this case the shop physician would also make house calls. This solution is advisable for large enterprises and should reduce the number of section contingents served by the physician. In the existing system of providing medical services, one and the same physician is counted twice—once as a person who is served at a territorial section and once as a person who is served in a shop section. If both types of service are delegated to one physician, the number of individuals needing services in the territorial sections would decrease by the tens of thousands of workers who are currently receiving services from shop physicians. Such a reduction in the numbers of persons receiving services is necessary because the extent of the service rayon is increasing considerably and shop physicians must spend significantly greater amounts of time traveling to make house calls than does the territorial section physician. Such a section should apparently be termed a joint section, and a physician working in such a section should receive all of the benefits that are currently being enjoyed by the territorial section physician. This would not only solve the problem of providing the physician with information. His responsibility for the quality of his work would increase greatly, as would control over the justification of temporary disability periods and other expert decisions. The physician of a joint section would not only be the "physician at work" but also the "family physician" who knows well and can make an allowance for all aspects of the patient's work and daily life.

Another issue that must be addressed is that of the transfer of medical information when a person moves to a new job or a new apartment. The outpatient history of an illness must be transferred to the new polyclinic according to the required procedure. This document should be required when a patient appears for a preliminary medical examination when being registered to work under harmful conditions. By studying a person's occupational history and health status over past years, the physician will be able to make a well-founded decision about permitting someone to begin such occupational activity. This problem must be solved by publishing the appropriate regulation. One possibility would be to return to the concept of a medical document containing basic information about health, harmful habits, occupational history, and other risk factors as well as the results of clinic examinations, etc. Such a document would be especially important in a period of transition to general clinical examination.

As the use of computers is expanded, it will become possible to gradually replace the outpatient illness history with materials stored in computer memory that can be called up onto a screen in the physician's office or printed out for him upon request. Understandably, an electronic history of an illness cannot be a complete analogue to a usual history. A decision must be made as to what kind of information and in what form it will be stored in a computer data bank. The decision concerning storing the results of analyses is the simplest—storing digital data is easy and convenient. Storing the results of functional, roentgenologic, endoscopic, radioisotopic, pathomorphological, and other studies or the results of a physician's examination is more complicated. In our view, one acceptable variant is to prepare manuals of formalized conclusions that are as concise as possible and that each have their own codes. In this case, the information about each patient would be made as concise as possible, but the sizes of reference libraries would increase significantly. It should be remembered that the amount of punching required for variable information is thereby reduced, which will reduce operating expenditures for the system. If this point of view is adopted, it will be necessary to develop unified all-union references describing physicians' conclusions with regard to all types of research under the aegis of the largest medical scientific centers in the near future.

In our view, formalized descriptions of operational interventions and manipulations that make it possible to edit text on screen and then print it out will result in a real time savings. We have begun such an experiment.

Solving the aforementioned problems is also important from the standpoint of optimizing the hardware complexes with which medical computer centers are equipped.

The problems that have been discussed here do not have one unequivocal solution. They should be discussed on the pages of this journal, and collective recommendations should be developed. The latter should then be confirmed in directives. The list of problems in need of discussion will undoubtedly expand during the course of this discussion.

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Modification of Cytogenetic, Anatomical and Physiological Changes in Seedling Cells and Organs after Long Space Flight by Biologically Active Compounds

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[Article by A. A. Aliyev, G. S. Nechitaylo, Z. A. Novruzova, G. K. Ragimova and U. K. Alekperov, Institute of Botany, AzSSR, Baku]

[Abstract] Analysis of the effects of a 522-day storage of spring onion seeds (A. fistulosum) on the Salyut-7 space station, according to cytogenetic, physiological and anatomical parameters, and modification of the changes which occurred by using natural biologically active compounds were described and discussed. Control seeds were stored on Earth under laboratory conditions. Control and experimental seeds were germinated in a thermostat at 25°C on Petri dishes in water and in solutions of α-tocopherol ($1X10^{-2}$ and $1X10^{-4}$ μg/liter) and auxin (1 and $1X10^{-1}$ μg/ml). Germination of experimental and control seeds in water revealed significant differences in anatomical, cytogenetic and physiological parameters aside from some changes attributed to natural aging of the seeds. Germination of the seeds in α-tocopherol and auxin at the concentrations used helped to restore the viability and increased the germination level in experimental and control seeds. α-Tocopherol at a $1X10^{-4}$ μg/ml concentration produced the greatest modifying activity. Figures 3; references 18: 11 Russian; 7 Western.

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